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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
AN, SHAWN S	
ART UNIT	**PAPER NUMBER**
2621	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/27/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/616,894	HALLAPURO ET AL.	
	Examiner	Art Unit	
	Shawn S. An	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25,27-33 and 35-38* is/are rejected.

7)☒ Claim(s) *26 and 34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/2, 6/1,10/6, 10/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 7-8, 12-17, 23-24, 27-32 and 35-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Zhang et al (2004/0076333 A1).

Regarding claims 1 and 14, Zhang et al discloses a coding system/method for coding a video sequence (Fig. 1, 14), in which the video sequence (Group Of Pictures) is divide into blocks [0036], and a block of the picture is encoded (14) using one of a number of different types of motion compensated prediction, including at least a single picture (P picture/frame) prediction type that employs motion compensated prediction to generate predicted pixel values for the block by using an interpolation filter (10) operating on pixel values of a single reference picture [0133-0134], comprising:

means for selecting a type (P picture/frame) of motion compensated prediction and means for changing the interpolation filter (to optimized interpolation filter) based on the selected type of motion compensated prediction [0134],

wherein complexity of the interpolation filter (10) used to generate predicted pixel values for the block is dependent upon a characteristic of the block [0055-0057].

Regarding claim 3, Zhang et al discloses changing the type of the filter (Fig. 3, 324).

Regarding claims 7, 16, 28, 30, and 36, Zhang et al discloses selecting an interpolation filter (10) to be used in dependence on the size of the picture block [0036; 0042].

Regarding claims 8, 17, and 29, Zhang et al discloses selecting an interpolation filter (10) in dependence on the shape of the picture block [Figs. 4-6; 0014].

Regarding claim 12, Zhang et al discloses defining a set of interpolation filters [0043] for use in connection with a particular prediction type [0134].

Regarding claim 13, Zhang et al discloses providing an indication of a particular one (Eq. 3) of the set of interpolation filters to be used in MC prediction of a block [0134].

Regarding claims 23-24, 31-32 and 37, Zhang et al discloses a video encoder comprising an apparatus/method for performing motion compensated prediction (Fig. 1, 14), wherein the motion compensated prediction comprises means for selecting an interpolation filter (10) to be used during motion compensated prediction of a picture block in dependence of the type of motion compensated prediction used [0055-0057].

Regarding claims 15, 27, and 35, Zhang et al discloses selecting an interpolation filter (10) to be used in dependence of the characteristic of a picture block [0055].

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2, 4-6, 9-11, 18-22, 25, 33, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al (2004/0076333 A1).

Regarding claim 2, Zhang et al does not particularly disclose the complexity of the filter being dependent upon the type of motion compensated prediction used in encoding the block.

However, it is conventionally well known to utilize both types of P and B pictures/frames in the motion compensated prediction scheme.

Furthermore, Zhang et al teaches using an initial (interpolation) filter for the first P frame, and the optimized interpolation filter for other P-frames [0134].

Therefore, it would have been considered obvious to a person of ordinary skill in the relevant art employing Zhang's teaching as above to recognize the complexity of the filter being dependent upon the type of motion compensated prediction used in encoding the block as an efficient way to adaptively accommodate conventional types of P and B pictures/frames in the motion compensated prediction scheme as a matter of design choice.

Regarding claims 4-6, Zhang et al discloses complexity of the interpolation filter as discussed above, and also discloses adaptive interpolation filters may have a fixed number of taps, and the taps may be selectively utilized to interpolate motion vectors in the reference frames for producing an optimal prediction gain for motion compensation [0046]. Furthermore, Zhang et al teaches the interpolation filters comprising a 2-tap filter and a 6-tap filter, wherein the 2-tap filter is shorter than the 6-tap filter [0043], and AIF for interpolation filtering based on filter coefficients [0044-0045].

Moreover, it is conventionally well known to utilize multi-picture prediction types such as P and B pictures/frames in the motion compensated prediction scheme to generate predicted pixel values for the block.

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teachings as above to recognize the complexity of the interpolation filter being reduced, when using multi-picture prediction type by using a shorter filter and/or a filter having fewer coefficients for generating predicted pixel values for the block as a matter of design choice for producing an optimal prediction gain for motion compensation.

Regarding claims 9 and 18, Zhang et al does not particularly disclose the interpolation filter operating on pixel values of more than one reference picture/frame being shorter than the interpolation filter operating on pixel values of a single reference picture.

However, Zhang et al teaches adaptive interpolation filters may having a fixed number of taps, and the taps may be selectively utilized to interpolate motion vectors in the reference frames for producing an optimal prediction gain for motion compensation

[0046]. Zhang et al also teaches the interpolation filters comprising a 2-tap filter and a 6-tap filter, wherein the 2-tap filter is shorter than the 6-tap filter [0043].

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teaching as above to recognize the interpolation filter operating on pixel values of more than one reference picture/frame being shorter than the interpolation filter operating on pixel values of a single reference picture as a matter of design choice for producing an optimal prediction gain for motion compensation.

Regarding claims 10 and 20, Zhang et al does not particularly disclose the interpolation filter operating on pixel values of more than one reference picture/frame comprising a 4-tap filter and the interpolation filter operating on pixel values of a single reference picture comprising a 6-tap filter.

However, Zhang et al teaches adaptive interpolation filters may having a fixed number of taps, and the taps may be selectively utilized to interpolate motion vectors in the reference frames for producing an optimal prediction gain for motion compensation [0046]. Zhang et al also teaches the interpolation filters comprising a 4-tap filter and a 6-tap filter [0043].

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teachings as above to recognize that the interpolation filter operates on pixel values of more than one reference picture/frame comprising a 4-tap filter and the interpolation filter operates on pixel values of a single reference picture comprising a 6-tap filter as a matter of design choice for producing an optimal prediction gain for motion compensation.

Regarding claims 11 and 21, Zhang et al does not particularly disclose the interpolation filter operating on pixel values of more than one reference picture/frame is dependent on a fractional pixel position in calculating a sub-pixel value.

However, Zhang et al teaches the MV having fractional pixel resolution, and therefore may refer to the position of the image signal within the reference frame, and estimating and compensating the fraction pixel displacement in the reference frame [0036]. Zhang et al also teaches that the interpolation with the adaptive interpolation

filter system of the reference frame allows for the generation of fractional pixel motion vectors [0041].

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teaching as above to recognize the interpolation filter operating on pixel values of more than one reference picture/frame being dependent on a fractional pixel position in calculating a sub-pixel value as a matter of design choice for producing an optimal prediction gain for motion compensation.

Regarding claim 19, Zhang et al does not particularly disclose the interpolation filter operating on pixel values of more than one reference picture/frame having fewer coefficients than the interpolation filter operating on pixel values of a single reference picture.

However, Zhang et al teaches identifying a series of coefficients that may be utilized to interpolate reference pictures/frames [0065].

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teaching as above to recognize that the interpolation filter operates on pixel values of more than one reference picture/frame having fewer coefficients than the interpolation filter operating on pixel values of a single reference picture as a matter of design choice for producing an optimal prediction gain for motion compensation.

Regarding claim 22, Zhang et al discloses a method of motion compensated prediction (Fig. 1, 14), in which a video sequence (Group Of Pictures) comprises number of pictures/frames, in which a picture/frame is divide into blocks [0036], and a block of the picture is encoded (14) using one of a number of different types of motion compensated prediction, including at least a single picture (P picture/frame) prediction type that employs motion compensated prediction to generate predicted pixel values for the block by using an interpolation filter (10) operating on pixel values of a single reference picture [0133-0134], comprising:

determining the type (P picture/frame) of motion compensated prediction and

changing the interpolation filter based on the determined type of motion compensated prediction [134].

Zhang et al discloses all of the claimed features with the exception of determining *types* of motion compensated prediction (such as a Bidirectional (B) frame).

However, it is conventionally well known to utilize both types of P and B pictures/frames in the motion compensated prediction scheme to generate predicted pixel values for the block.

Furthermore, Zhang et al teaches using an initial (interpolation) filter for the first P frame, and the optimized interpolation filter for other P-frames [0134].

Therefore, it would have been considered obvious to a person of ordinary skill in the relevant art employing Zhang's teaching and conventional use of P and B pictures/frames in the motion compensated prediction scheme so as to determining the types (P and B pictures/frames) of motion compensated prediction, and changing (Fig. 3, 324) the interpolation filter based on the determined types of motion compensated prediction as an efficient way to adaptively accommodate conventional types of P and B pictures/frames in the motion compensated prediction scheme as a matter of design choice.

Regarding claims 25, 33, and 38, Zhang et al discloses all of the claimed features (discussed in claim 37 above) with the exception of a decoder.

However, Zhang et al also discloses a decoder including a decoding module and a reconstruction module, and receiving encoded bitstream from the encoder (14).

Furthermore, a conventional decoder is a mere reverse processing of the corresponding encoder for reconstructing compressed video/audio data.

Therefore, it would have been obvious to a person of ordinary skill in the relevant art employing Zhang's teachings as above to recognize the decoder being able to perform all of the claimed features after receiving encoded/compressed bitstream from the encoder to generate reconstructed video/audio data.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

A) Kim et al (5, 541, 660), Systolic realization of motion compensated interpolation filter.

6. Claims 26 and 34 are objected to as being dependent upon rejected base claims 23 and 31, respectively, but would be allowable:

if claim 26 is rewritten in independent form including all of the limitations of the base claim 23 and any intervening claims; and

if claim 34 is rewritten in independent form including all of the limitations of the base claim 31 and any intervening claims.

Dependent claims 26 and 34 recite novel features, wherein the prior art of record fails to anticipate or make obvious the novel features.

Accordingly, if the amendments are made to the claims listed above, the application would be placed in condition for allowance.

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to *Shawn S An* whose telephone number is 571-272-7324.

8. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SHAWN AN
PRIMARY EXAMINER

12/21/06